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ABSTRACT

It is the basic premise of this study that advanced societies are becoming too heavily impacted in archaic idea logistics and consequently tend toward stagnation. A profound transformation is developing, however, in the emergence of philosophically oriented idea logistics and radically new concepts of institutional organization which could enable nations to sustain continuously high creative momentum and to have vastly greater capacity to deal wisely with the dynamics of change. This project is a study of the emerging development of such philosophically exploratory methodologies and institutions in Europe and the United States. (Author)

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IDEA LOGISTICS AND DYNAMICS

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Author's Abstract

Civilization moves forward on ideas. The dynamics of progress of nations and their abilities to control their destinies depend largely upon how they deal with ideas. Advanced societies can be philosophically expansive. That is, they can sustain high levels of creative dynamics and high impulse momentum through optimization of their idea generating and developmental capabilities. Or institutions and societies can fossilize around existing idea structures and ideologies, and thereby fail to understand the character of change that is developing. Such societies are destined to move from catastrophe to crisis along paths of uncertainty and anguish.

It is the basic premise of this study that advanced societies are becoming too heavily impacted in archaic idea logistics and consequently tend toward stagnation. A profound transformation is developing, however, in the emergence of philosophically oriented idea logistics and radically new concepts of institutional organization which could enable nations to sustain continuously high creative momentum and to have vastly greater capacity to deal wisely with the dynamics of change.

This project has been a study of the emerging development of such philosophically exploratory methodologies and institutions in Europe and the United States. A forthcoming book will further delineate the subject.

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U.S. DEPARTMENT OF
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Office of Education
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Preface

To philosophize with some of the explorers and pioneers of long-range movements in Europe and the United States has been a truly exhilerating pleasure. The author wishes to express his most grateful appreciation to those who so willingly and eagerly cooperated in giving this project its vision, objectivity and substance. This report is but a cursory treatment of a subject that will be more fully developed in a book tentatively titled: The Dynamics of Ideas.

Modern literature is prodigious in the character of change in advanced soceities. Much of this is diagnostic in character. It deals with the pathology of society - a description of the diseases of advanced society and how they might be cured. There is, I believe, both a validity and an urgency in exploring the positive side of the dynamics of change. Organizational concepts are changing rapidly, largely by the impetus of reactive forces in society. But there is need of exploring more fundamentally the organization of society of the future- beyond the diagnostic and pathological, beyond the reactionary stages. This would be an exploration of how advanced societies might be organized to sustain high levels of creative power and be masters of their destiny - how they might organize for long-range human fulfillment and survival.

In such an exploration, the unknowns vanish into a mist of uncertainty. Yet it is uncertainty embedded in the reality that all of civilization's progress depends upon how our complex highly institutionalized society deals with ideas and how it endeavors to optimize the creative function. It is a subject that is destined to be of growing prominence as societies become increasingly institutionalized and more complex.

Contrary to usual research, this has been an open-ended subject which has innumerable possible labyrinths of exploration. Attempts to formulate "conclusions" seemed so tenuous and presumptuous that the author has substituted a brief section on "General Observations."

However tenuous the subject might seem at present, one must admit the validity of Kettering's humble plea: "We ought to be more concerned about the future, because that is where we will spend the rest of our lives."

Finally, the author wishes to express his most grateful appreciation to the U.S. Office of Education and to the National Institutes of Health for the support which has made this project possible.

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INTRODUCTION

For almost two decades a subject which I have termed the Creative Dynamics of Advanced Societies has intrigued me and been a matter of serious study. What determines whether advanced nations will be able to sustain continuously high creative levels and be masters of their destinies? Will they eventually stagnate and get lost in dense jungles of myopia and despair?

As Executive Secretary of the American Society for Engineering Education and editor of its Journal, early in my career, I developed strong convictions that the ways in which institutions deal with ideas are far from optimum, and that this severely retards the whole system of the generation and development of important ideas, and their emergence into the mainstreams of society.

To put it bluntly, an advanced society can lose its creative momentum and stagnate because its institutions are not adequately responsive to new ideas. The levels of creative accomplishment are very much a function of the ways in which institutions deal with ideas. "Institutions," as used here, will be a generic term used to broadly encompass those organizations which deal with ideas and advances in knowledge at the cutting edges of progress - universities, learned societies, professional societies, as well as the idea generating sectors that provide the creative and innovative leadership of industry and government.

Ideas and institutions are mutually interacting. Ideas propel institutions. Institutions can confer great creative and innovative powers upon individuals and endow them with countless knowledge resources to develop their ideas. But institutions also powerfully influence the modalities of thought, of research, of idea conception, of domains of human endeavor. They can be innovatively and philosophically expansive, imparting high creative momentum to society. Or they can be immoble, inertia-bound, myopic and structured to perpetuate the infinite perfection and refinement of present-day structures of knowledge.

If the institutions of an advanced society are not adequately mobile and philosophically expanding, then they impose a ceiling on a nation's creative powers and this may bring about the inability of society to sustain high creative momentum and to be master of its own destiny. The whole system can saturate or sink into a non-creative society which is plagued with immorality and imponderables beyond comprehension. "The last gasp of a dying civilization," said Spengler, in a prophecy of the ultimate decline and collapse of Western Civilization, will be the "refinement of techniques." This is the stage at which everybody is working on the small challenges and problems because the big ones have grown far beyond man's comprehension or ability to do anything about them.

All of progress is related to knowledge and its use. Yet we know so very little about how societies develop and utilize knowledge. It is my personal belief, based on more than a decade of study, that our idea logistical systems, that is, our institutions which are supposed to be at the forefront of knowledge generation and utilization, generally speaking, tend to be built on outworn traditional concepts, to be poorly conceived and to be highly inefficient from an idea logistics viewpoint. Knowledge generation and utilization has the peculiar dichotemy of being extremely productive in certain domains of highly concentrated effort, but seriously deficient in many of the dimensions that are supremely important for society's advance and civilization's survival.

What is it that determines the creative levels of advanced societies? Are there inexorable limits to the rate at which man and societies can climb in their creative accomplishments? Is there an iron law that circumscribes the rate of progress of nations, or the outer limits of civilization's progress?

I suggest that there is need to develop two sciences, both of them macrosystems approaches. One would deal with the creative dynamics of societies. Let me offer an example. We accept the inevitability that underdeveloped nations, such as India, for example, are locked into social and political systems that have high inertia. Consequently, despite the prolific expansion of education and introduction of technology, the climb out of the slough of despond for most of the people of these nations will be a protracted, tortuous and slow-release process.

In a nation such as India, social custom and political orthodoxy largely dominate the rate of growth. For a nation which lives in sixteenth century ideas to move into the nineteenth and twentieth century involves a profound cultural and social shock. All of this we accept as inevitable, and when Herman Kahn prophecies that it will take India 117 years to catch up to the 1967 U.S. standard of living it isn't challenged.

But is this intolerable delay and human suffering inevitable? Is it possible to devise entirely new concepts of government and social structure so that the leading professional intelligence of the nation - the people of knowledge, accomplishment and experience - might collaboratively devise far-reaching plans for growth and also a far more efficient system of knifing through political and social fetishes, orthodoxies and inertias to set a more rapid pace of progress? This, I believe is not only possible, but such higher efficiency systems will evolve. It is inevitable that entirely new concepts of democracy, indeed of governments of all kinds will evolve, that some of our own concepts of democracy will be archaic long before the year 2000.

Quite obviously, the creative dynamics of nations, that is, the influences which determine how rapidly nations will progress in all dimensions of growth, is governed largely by the nation's institutions and how they deal with ideas. But we know very little about how institutions might deal with ideas efficiently and effectively. The most important ideas - the ones which ultimately most profoundly change nations, our outlook, and civilization's progress so often get jammed in the gun barrel, and they don't come out the other end. Often they don't make their impact to produce change until a generation or so after the innovator is dead and buried in his grave.

A science of creative dynamics would deal with important aspects of how nations achieve major breakthroughs in progress, including how they define progress. This at first appears to be a hopelessly confused and involved subject. But from my studies of this subject, I have concluded that there are certain fundamental principles which can be deduced as a logical basis for a science of creative dynamics. Creative dynamics, as applied to cultural growth in any one of many cultural fields, involves many of the same basic principles as creative dynamics in the sciences or in political domains, or social, or medical. There are obviously differential characteristics, but there is also a solid body of universal fundamentals.

The creative dynamics of whole societies, likewise embody certain more or less universal fundamentals. At present, we have a vast array of generalizations in many widely diverse fields. But there is need to develop a systematization, a common science of the creative dynamics of societies that will enable nations to understand how they might more fully optimize their progress.

Philosophically Oriented Idea Logistics*

Central to the subject of creative dynamics is the subject of Idea Logistics and Dynamics, that is, how do ideas move societies, and how do advanced societies deal with ideas?

Ours is a fast-pacing, highly innovative nation, a nation which has gained great power and mobility through the expression of ideas throughout the vast matrix of a complex, highly institutionalized society. But generally speaking, ours has not been a philosophically oriented society. It has lived much too close to the present to be able to see its future. Increasingly we are becoming aware of the strategic and essential importance of philosophical projectivism as an instrument of idea logistics. There is both a legitimacy and a necessity of exploring ideas beyond the contours of present-day knowledge and idea structures. There is an imperativeness about seeking a better ordering of our knowledge of the future and deriving both philosophical and functionally creative deductions from this knowledge. It is becoming abundantly evident that a society which is incapable of looking beyond the present into the future is destined to be a crisis-oriented society, and it will pay severe penalties for its philosophical myopia.

The deleterious effects go far beyond the penalties resulting from society's inability to identify the precursors of disaster. Poor idea logistics can impede the emergence of exceedingly important embryo ideas. It can retard and truncate the intellectual and creative life of a nation.

New ideas are often fragile, tenuous, amorphous and filled with doubts and confusion. There may be little that can be proven. Such ideas seem trivial, and unimportant in competition with the well-structured idea domains of far less consequence that preempt the forums and publications of learned societies. Experience has

*Philosophy as used here refers to the boundless exploration of idea domains, usually by persons who are intimately acquainted with the state of the art, or by inter-disciplinary groups of such people who are exploring the interaction of many domains in a larger "holistic" context. This is a quite different concept from that of philosophy as an academic subject, altho there are obviously overlapping connotations, Quite obviously, one leaves the domain of certainty when dealing in philosophical explorations and enters into demains of probability, with the probability diminishing the farther out on a time scale or projective scale that one proceeds.

shown that many of the greatest ideas which have transformed man's foundations of knowledge or which have profoundly changed the course of civilization were deeply submerged in the noise and confusion levels of universities and learned societies for inordinately long times before their "take-off".

We know very little about how to identify potentially important ideas early - how to find the golden nugget in the haystack. Furthermore, even after important ideas are brought into clear focus, it sometimes seems that all of heaven and earth is dead set against even exploring their possibilities. For example, Woodrow Wilson's idea that an instrument to bring nations of the world to a common forum where their differences and grievances could be aired, and which would have a peace-keeping force and judicial apparatus, was rejected in the United States. It took a second world war almost a quarter of a century later to prove that Wilson was right.

Increasingly, it is becoming apparent that there is need for developing philosophically oriented forums, publications studies and organizations to deal with ideas in a quite different way than has been customary in the disciplines and learned societies. The idea logistical methods that have proven to be admirably suited to powering the massive machinery of progress may be very poorly suited to providing the philosophical dimensionality that is seriously needed in order to get perspective and balance with a long look ahead. Nor are they well suited to bringing forth new ideas effectively and expeditiously.

The difficulty, I believe, arises out of certain traditional defects and taboos that have been built into our highly institutionalized idealogistics. Institutions, by common consent tie themselves down to the sterner stuff of the world of provable reality and extant knowledge. Whatever can be proven may be worthy of consideration for presentation before a learned society forum; all else is either circumspect or excluded. This terra firma doctrine discourages attempts to engage in philosophically projective exploration of ideas in the farther reaches. One should not prostitute one's profession by attempting to research the future. This is the sordid world of charlatans and crackpot, of people who speak irresponsibly out of hollow heads, and of rubbish piles of misguided perversions.

But increasingly we are learning that this is too limited a concept of idea logistics; that achieving adequate philosophical dimensionality may well be the most important ingredient in developing good idea logistics. Furthermore, some highly successful methodologies are evolving to bring about the philosophical exploration of ideas far beyond the contours of present-day knowledge. Effective ways are being found to identify those

individuals whose intensive commitment to new creative ideas are worth listening to and enlarging in philosophically interactive forums. More importantly, however, the development of this hitherto largely forbidden sector of idea logistics is essential to enlarge the creative outlook and capacities of individuals, and thereby counter-balance the Spenglarian downdrift.

It is doubtless a safe prediction that the predominantly terra firma idea logistics to which our academia and learned societies have become so firmly committed will be quite inadequate for the society a quarter century hence, or indeed that society at that time could even survive on our present framework of idea logistics. Our present-day idea logistics are highly constrictive and they do not project at all well into the future.

The geometrical expansion of knowledge that is destined to evolve, and the growing complexity of a world which will become ever more highly institutionalized, will most certainly necessitate the evolution of far more philosophically-oriented idea logistics. The beginning stages of this evolution are clearly discernible today. I believe that we are only on the foothills of a profound evolution in idea logistics that will impart much larger philosophical dimensions and thus vastly greater power to the search for knowledge and to the capacity of society to deal wisely and intelligently with its future.

Our intellectual system has produced vast metropolises of separate and distinct disciplines, each infinitely complex, infinitely detailed, and also infinitely busy. The challenge of the future will be to build superhighways that cut through all of these metropolises and interconnect them in many meaningful ways, some of which will deal holistically with global macrosystems issues and with projective explorations in ways that we can only vaguely perceive today. These, I believe, will derive from philosophically exploratory methods that will turn scholar's visions outward and lift more of the scholarly creative ambitions to the ultimate challenges of mankind.

Furthermore, the central problem is not only that of developing better idea logistics. Perhaps of even greater overall importance, is that of the interface between idea development and their penetration into the mainstreams of society. Here new ideas, however imperative and logical, so often encounter infinite impedance and stall on dead center. Ideas which benefit people directly are eagerly accepted. Ideas which have a pot of gold at the end of the rainbow likewise move fast. But ideas that may deal with the ultimate destiny of societies, of civilization or of mankind usually get fouled up or lost in the quicksands of politics, or public apathy, or of social or institutional inertia.

PRINCIPAL INVESTIGATOR'S BACKGROUND IN THIS STUDY

National Science Foundation Conference(1)

In 1959, as a member of the National Science Foundation Advisory Committee on Engineering Sciences, with an opportunity to survey the full panorama of research proposals, I developed a strong conviction that most of the research lacked originality and the kind of uniqueness that might lead to significant discovery. So much of it was of the Pied Piper variety, heavily concentrated in well-established fields that had been ploughed over and over again. These were the predominate fields that were uniformly taught in engineering colleges throughout the nation. They were also the same fields that were dominant in professional engineering societies, where an endless array of papers and publications, largely at hole-plugging or trivia levels, occupied the effort.

Science and technology, to be sure, were moving along at a phenomenal pace. New discoveries led to the establishment of new academic fields. Outwardly, the creative system was seemingly miraculous. However, so many of these miracles were in new fields on the rapid rise.

It is difficult, of course, to identify potentially important ideas early in the embryo stages. But so much of scholarly research just had no prospects of achieving anything other than building little stepping stones to the future and archive stuffing. The professional societies themselves seemed to have no adequate means of philosophically exploring their own futures. Engineering seemed to be sailing in uncharted seas. Furthermore, the professions, generally speaking, didn't seem to have adequate means of bringing new embryo ideas that were outside of the conventionally accepted domains into prominence. In brief, creative progress seemed to be a quite random, haphazard process in many respects, and was being fouled up by quite inadequate concepts of idea logistics. After discussions with members of the NSF advisory committee, I obtained a grant from the National Science Foundation to undertake a two-day conference in cooperation with fifteen of the nation's leading scientific and engineering learned and professional societies to get some bearings on this dilemma.

Forty leading scientists and engineers of the nation were invited to participate in a two-day conference at Worcester Polytechnic Institute, where I was president. The purpose, as stated in the preface of the published report was:

> "The pace of progress of our whole emerging pattern of scientific and technological development depends largely upon our ability to bring forth research people who can leap ahead to the goals of larger ultimate consequence. However, it is clearly evident that the rigidities of a highly structured society have erected formidable barriers to this kind of originality of thought and independence of effort. Most of our research effort is concerned with small extensions of existing knowledge in well traveled fields. This massive frontal attack is essential to technological and industrial progress. But by its very nature, most of this research has virtually no promise of leading to discoveries which will open doors to promising new fields of scientific or technological exploration."

> "Can we now find ways of creating those conditions which will give more of our talented youth a new lease on the future - a new zeal for the pursuit of distant goals that might lead to highly significant discoveries...?"

Obviously, the die had been cast by the uniformity of the engineering colleges, which was also reflected in uniformity in the professional societies. So much of the nation's research was being stamped out over and over again in the same molds, but with slight variations. Furthermore, I became quite convinced that this Pied Piper effect existed not only in engineering, but was prevelant throughout all fields of university research, not only in the sciences and technologies, but in the social sciences and the humanities as well.

The conference report developed several aspects of the dilemma and a number of recommendations. It urged that:

> "Scientific and engineering societies have not often idulged in philosophical explorations of the future... Yet this philosophical assessment of the future may be the very experience that would captivate the minds of eager, talented young researchers and trigger some of them off in the bold pursuit of new ideas."

Twenty-Five Year Projective Study[2]

Immediately following the NSF project, I arranged a luncheon meeting with the President and Vice President of the Engineers Joint Council (Dr. Agustus Kinzel, Vice President of Union Carbide Company and Dr. Clarence Linder, Vice President of the General Electric Company) to propose that the EJC undertake a twenty-five year projective study of engineering. This would: a) explore new domains of technology which seemingly hold great promise for the future; b) search for promising new frontiers of science that might hold highly promising possibilities for important technological developments in the future; and c) identify fields where there are major technological deficiencies in our nation's growth.

A study committee was formed under the able chairmanship of Dr. E.H. Hollomon, then Director of Research of General Electric Company, who had attended my previous NSF conference. This resulted in a two-year study which involved over one hundred leading scientists and engineers. Its findings shocked the engineering profession into a realization that technology was not developing smoothly on all fronts, that it was massively distorted with catastrophic deficits in terms of national need. A number of these deficiencies have since become prime national goals, aggregating billions of dollars of national appropriations. Curiously enough, the technological deficiencies mentioned below, at the outset of the EJC study were not in the focal spotlight in any of the professional societies most directly concerned. There had been virtually no planning of projective assessments of future needs of the nation in these fields. These included:

a) Transportation: Nationally, urban and interurban transportation was in a shambles. It had long been a technologically stagnant domain. There was just no way of projecting present systems into the future without a massive nationwide program of research, systems planning and rebuilding.

When a national program finally did develop, about seven years later, it became necessary to leap right over research and go on to systems planning, using dressed up old technologies, thereby assuring rapid obsolescence. Exciting new technological innovations seemed realizable - air cushion suspension for a smooth-as-velvet noiseless ride; high speed underground tunneling to put systems below ground could eliminate noise and traffic snarls, and it could also increase speed; linear induction motor propulsion; gravity acceleration systems for ultra-high speed in tunnels, etc. However, research on such major innovations would require a twenty year lead time. This research should have gotten started at least fifteen years earlier. Research was coming too little and too late.

b) Technolo[gically Deprived Industries]: Large sectors of American ind[ustries are in grave jeopardy of extinction because of f[oreign competition. These are industries which have never l[earned how to utilize modern technology. The managements [are not technologically-oriented, they don't have technol[ogical developmental staffs capable of significant [innovation.

Technol[ogy had been off fighting wars and building the super-indust[ries. America had lost t[he watch industry, typewriters, [transistor radios and much of textiles, cameras, automobiles, [etc. because foreign competition had caught up in both tech[nological and managerial competence. Now whole industries w[ere cliff hanging. The full impact of this technologica[l blindness has yet to hit the American economy.

c) Technolo[gies for Building Construction]: America could undertake a [program to eliminate slums in all cities of the nation and a[ccomplish this large[ly within twenty five years. To do this e[conomically - to rebuild large portions of cities and develop [new urban communities - would, however, require large-scale [research programs to develop modern technologies for the construct[ion industry. Little has been done since [in] bringing mode[rn technology into the construction industry. Labor unions [are fearful and obstructive. It is a high-inertia fiel[d that doesn't take kindly to new technologies. It is a self-[blocking system. A decade after the EJC study the slums pe[rsist and have become this nation's greatest problem. Bu[ilding construction costs have shot sky high.

d) Medical [Science and Services]: Medical and biological science coul[d be profoundly accelerated by scientific and technological [research to develop far more powerful research instrumentati[on, computer useage etc. Costs of medical and hospital ser[vices could be greatly reduced by modern technologies, [automated diagnostic clinics, etc.

NIH and [NSF had already identified this as a prime field and have sinc[e developed greatly enlarged programs and focused on biomedical [engineering. The EJC study merely reinforced the importanc[e.

e) Environme[ntal Pollution]: Clearly nations and cities were facing seriou[s problems of air, water and noise pollution. This was rapi[dly becomingacritical national problem. However neither the s[cientific nor the engineering profession was concerned abo[ut it, other than sporadic, specialized professional papers. Cert[ainly, in 1960 there had been no assessment that would indicate the [order of magnitude of one of the world's most catastrophic [dilemmas.

The EJC study preceeded by about seven years the abrupt blow-up nationally of the ecology dilemma. Today, of course, this is a multi billion dollar national program.

It would indeed be naieve to take credit for the projection of all of these issues into national focus. The nation itself was just beginning to undergo a major turn-around and was searching for new bearings. In another six to eight years, the outlook was destined to change drastically. However,the fact that our Committee Chairman became Assistant Secretary of COmmerce and was both a convincing persuader and a highly competent technologist did have a strong influence in alerting government and Congress as to the blindness that was leading to future chaos.

It all seemed so far away in 1959. Even the specialty fields within the professional engineering societies were blind to national needs in their own fields where the dereliction and need were rapidly going critical. They were all projecting the future on the basis of the past, which so often has proven to be a totally fallacious assumption.

In the National Science Foundation, there was nobody that I was aware of who was seriously concerned about most of these issues at that time. The fields of technological forecasting and assessment, which have since become popular, had not yet emerged. They were to come along about six years after the EJC study.

This EJC study was a classic of its kind in that it was the first time that the engineering profession had endeavored to undertake a large-scale projective study of futures. It produced a profound shock in the engineering profession in the realization that the profession had been quite blind to its own future and consequently was grossly derelict in its responsibility to the nation. This EJC study strongly influenced the formation of the American Academy of Engineers.

One might be tempted to conclude that, with all of the current emphasis on technological assessment today, and with the plethora of national and international conferences on the year 2000, that have since emerged, the fundamental problem is solved. I am quite convinced, however, that the dilemma is far outrunning both in magnitude and in criticality our attempts to find solutions. Fundamentally, universities and learned societies are still all too massively locked into the same structures of academic disciplines and the same Pied Piper syndrome. They haven't changed their format much.

Guidelines for Research Collaboration

A collateral aspect of this problem, about which I have long been concerned, is the high degree of isolation that has always existed between our nation's two principle research domains - university research and industry research. Obviously one would expect close collaboration between these two domains, at least in those research domains of mutual interest at the frontiers of knowledge. This, however, has not developed. For example, over 80% of research in engineering colleges is supported by government, while less than 8% is supported by industry. Obviously there is something wrong.

In 1970, I initiated a project in the American Society For Engineering Education to study research collaboration between engineering colleges and industries, in order to determine why this isolation exists. Might there be an entirely new kind of industry - college relationship developed which would substantially enlarge the research horizons and encourage industry-college research collaboration?

I proposed a study of this dilemma in the search for new outlooks and then accepted responsibility for organizing and managing the study and raising the funds from corporate philanthropic foundations. Four conferences were held with universities as hosts in different parts of the nation. These two-day conferences brought together about 80 corporate research executives and 40 engineering deans.

The report stated:(3)

> "The problems explored are national in character and of paramount concern in their influence on the pace of progress of our nation's scientific and technological growth. The present estrangement and alienation that exists between industry and engineering colleges in research relations is all too prevelant. It is not a wholesome projection for the future."

The absence of executive-level communications between engineering colleges and corporations was identified as one of the principle causes of research isolation. Accordingly, it was recommended that executive-level instrumentalities be established within ASEE to provide forums and publications which would emphasize projections of the future of science and technology. This would also provide the basis of mutual collaboration between corporate executives and the deans and research directors of engineering colleges.

The report went on to stress that the engineering profession needs a more effective voice in the formulation of national research policy and that this could "greatly strengthen the hand of governmental planners who understand the criticality of getting adequate planning and innovative research started far in advance of systems design."

It was recommended that the professional engineering societies work collaboratively to undertake an annual research congress in which executive-level engineers would meet jointly with governmental agency heads and Congressmen to examine various aspects of national policy in a wide variety of issues that are technologically centered.

This study was reported by myself at a meeting of the American Society for Engineering Education, and subsequently at the World Congress of Engineers in Tel Aviv. The latter presentation has since touched off similar studies in other countries.

Incidentally, I have since been invited to present a paper on the Creative Society at the Third World Congress of Engineers, which meets in December 1973.

Philosophy of Futures

In a recent book: Science and Technology In The World Of The Future, (3) which I edited, in a chapter on "The Creative SOciety" I endeavored to set forth the need for developing a philosophy of the creative society.

. . . . . .

> "A society as advanced, as complex, and as highly institutionalized as ours must have a philosophy which understands itself. It must provide for the philosophical interplay among highly creative minds in the largest domains of thought. It must break through all of the rigidities that constrain thought to the present and find effective ways of dealing philosophically with the great challenges of the future. It must deal with the nobility of ideas. and open the floodgates to the great creative talents of the nation so that they can see the future in clearer perspective and build a creatively dynamic

society. In brief, there must be a viable philosophy of the creative society. That philosophy is yet to come."

"There is coming in our intellectual system, I believe, a revolution so profound that it will quite completely transform the ways in which the intellectual disciplines deal with ideas. The character of the times demands it, the accelerated tempo of the future will thrive on it , and the creative instincts of man will welcome it as an exciting new frontier. We are dealing here with the most unique of all creations - the human mind. The creative mind can rise above society only if it can find visions of the future, outlets for its creative expressions, and the ability to reshape the institutions of society toward a fuller and better purpose. But we have all too little understanding of how to bring about these conditions."

In a presentation before an International Convention of the European Technological Forecasting Association in London, I suggested:

"It is timely that we undertake a direct frontal attack on this whole exceedingly complex subject of philosophically-oriented idea logistics. We have been avoiding it because of a dangerously false bugaboo that we can't research the future, so we had better stay out of it. We need to replace this by the concept that there is a philosophical world of ideas that is infinitely larger than the pragmatic real world that we know so well. There are perceptive, highly knowledgable creative minds who are exploring this philosophical world - some of whom may have ideas that are vital to preserving the stability and sanity of society, and to providing intelligent solutions to the world's great problems."

These were projects all of which I initiated and helped to develop:

a) The NSF conference on Research Goals, in 1959;

b) The Engineers Joint Council conference on America's Engineering Research Goals (a twenty-five year projective study).

c) The study of the American Society for Engineering Education on Research Collaboration Between Industry and Engineering Colleges.

d) The book Science and Technology In The World of the Future* which I edited and in which I have written chapters on "The Creative Society", and "Peace, War and Technology". In the chapter on The Creative Society, I stressed the urgent need to undertake serious studies of "Idea logistics and dynamics," that is, how do individuals with potentially important ideas and institutions responsible for their development interact? How do ideas move institutions and societies, and contribute to civilization's advance and mankind's progress? How effecient are these institutions which are supposed to be at the cutting edge of progress in providing idea generating and idea development environments?

e) Papers presented before international meetings of the European Technological Forecasting Association and the World Congress of Engineers have developed certain aspects of the subject of the Creative Dynamics of nations.

Quite obviously, creativity and projective forecasting at the frontiers of knowledge have been subjects that have been widely explored in numerous national and international symposia and Congresses. Much has developed, particularly in the life sciences, the physical sciences and in technology. Most of the efforts are devoted to futures assessments in specific fields.

*Included in the Library Journal's list of one hundred best books published in 1970.

My personal interest is broadly based and deals with an endeavor to develop some underlying principles of idea logistics and dynamics that are universally applicable to creative progress. Eventually a great deal more will be known about the interaction between ideas and institutions. Our knowledge today, I believe, is still in a primitive stage.

METHODS AND PROCEDURES

This particular study of philosophically projective idea logistics has been rather diversified, but all centralized around the common theme of idea logistics. One project consisted of interviews with leaders of a number of philosophically exploratory groups in Europe, including the European Cultural Foundation, the Club of Rome, Swiss Federal Technical Institute, European Technological Forecasting Association, UNESCO and OECD. Considerable time was spent at the University of London and with various technological forecasting groups in England. This included a paper presented before the European Technological Forecasting Association in London.

A second project consisted of a study of the organization of professional engineering societies. In this portion of the study, I have prepared a suggested plan whereby the principle professional engineering societies might work collaboratively in establishing a unified professional engineering society that would deal more effectively with the social-economic-political dimensions of technological growth, both nationally and globally.

A third aspect involved participation in a conference at Herman Kahn's Hudson Institute, and some interviews at: the Center for Democratic Institutions in Santa Barbara, Stanford University, University of California (three campuses), and California Institute of Technology. Also, I participated in the White House conference on the Industrial World of Tomorrow.

A book on the subject: The Dynamics of Ideas, is currently in the writings stage. This book will seek to develop a firmer and more universal base for idea logistics.

The expenses for my European travel were largely born by myself, with some help from the University of Connecticut Research Foundation. The U.S.O.E. grant did not allow travel expenses for foreign travel. The USOE funds were used for California travel and some secretarial and duplicating expenses. Stringent new regulations imposed by the state government in Hartford, primarily to conserve state funds, however, carried over to grant supported projects. These made the project difficult to conduct without supporting a good share of the legitimate project expenses myself. A substantial portion of the grant funds is being returned.

GENERAL OBSERVATIONS ON IDEA LOGISTICS

The Inversion Syndrome

All of progress begins with ideas. Indeas energize the creative life of the nation. They are the roots of all of social and political progress. Ideas determine the character and rates of progress in every domain of civilization's advance and throughout mankind's evolution. It is ideas and the leadership that projects ideas into the mainstreams of human experience that produces a dynamically progressive nation - or a stagnant one.

The evolution of ideas toward larger philosophical dimensionality, I believe, is fundamental to the whole question of how an advanced society can sustain dynamic, progressive qualities, how it can control its own destiny and how it can guide global evolution in directions of peace and world stability.

Ours has been a fast-pacing, highly innovative nation on a fast rise. It has gained great power and mobility and creative energy. Generally speaking, it is not, however, a philosophically oriented society. We live much too close to the present to be able to see or to understand the evolving forces that shape the future.

So often those ideas that have most profoundly influenced civilization's advance or mankind's progress have been ignored, rejected, or buried in limbo until a major national catastrophe exposes the nation's tragic myopia to evolving forces that have been shaping up to colossal explosion. Woodrow Wilson's concept of a League of Nations was rejected and the issue closed, insofar as United States participation was concerned, until World War II engulfed nations all over the globe. Then suddenly the imperativeness of Wilson's idea became starkly evident.

Robert Goddard's philosophical idea that man would some day rocket himself and his scientific laboratory to the moon and the planets was never presented before a single major scientific society or professional engineering society during Goddard's thirty seven years of rocket research. Yet this idea has more profoundly revolutionized science and technology than any other scientific idea of our time. It has given mankind an exciting new philosophical outlook.

Frank Lloyd Wright's philosophical soaring in developing radically new foundations for architecture were rejected for over a quarter of a century by his architectural contemporaries. Today Frank Llyod Wright is heralded as the genuis who pioneered the greatest modern revolution in architecture.

In well established and well-supported fields, important new ideas can take hold rapidly and move through the developmental stages into the mainstreams -transistors, color televisions, SST, atomic energy. Everything is structured for their swift development - in universities, in professional societies, in industry, These are the examples that are usually cited to show that the time gap between the initial discovery of an idea and its utilization is closing.

Wars, revolutions, economic depressions, social upheavals, the international ecology crises, as well as all of the derelictions of the engineering profession previously mentioned in the EJC study, can be cited as examples of how fatefully myopic the learned and professional societies, as well as the universities and government have been to the shaping forces of destiny. The issues have so often been undefined, unexplored and unresearched until the onset of disaster.

Our first observation, therefore, is that:

> Experience has shown that ideas which have the most profound ultimate impact on civilization's advance and human progress often are buried, rejected, discarded, or ignored in their embryo stages. An "inversion" phenomenon develops in which ideas which later prove to be of supreme importance often have virtually no legitimacy or acceptability in professional and institutional society.

The corallary is obvious. This inversion phenomenon and the inability to deal with so many ideas of preeminent importance effectively in the embryo stages is evidence of the fact that our universities and learned societies are at times poorly structured to deal with the ideas of greatest ultimate importance, particularly in their early embryo stages. Learned societies, professional societies, universities, all tend to develop structured fixations which circumsci be the domains of ideas that they will consider and the ways in which they will function. A whole body of institutional regimen, fetishes, taboos, and limited contours can close in to compress the creative life of a nation. A Pied Piper effect lures scholars in vast droves into the catacombs of knowledge in the well-established heavily traveled domains which have traditional acceptability, where the minds of scholars are supposed to live in a cage and prove everything, but never soar philosophically.

Robert Oppenheimer's worm that digs deeper and deeper in its hole, not knowing where it is going, or even caring, so long as it is free, characterizes so much of scholarly research. It is philosophically myopic to the larger challenges and goals of mankind. It is so often unable to deal philosophically with unconventional embryo ideas so as to sort out those that might have great potential importance and deal with these efficiently. Philosophical projectivism just isn't generally accepted as a legitimate tool of scholarly research. It is for journalists or science fiction writers, or crackpots, but not for PhD students or serious scholars.

Thomas Kuhn has well documented the fact that most of the great scientific discoveries were either ignored or opposed, when first proposed. Even the experts, who had experienced bitter opposition to their own discoveries, turned around and became some of the bitterest critics of others, who made subsequent great discoveries.

Macrosystems Myopia

There is a widespread discontent among eminent leaders in widely disparate disciplines and professions arising out of both the disinterest and indeed the inability of learned and professional societies to create the kinds of instrumentalities that can bring the full force of professionalism - its forums and publications and conference studies - to bear on the evolution of large-scale multi-disciplinary issues and developments.

The engineering profession, for example, deals with the technological aspects of urban planning, transportation, construction, ecological and environmental protection, the technological build-up of developing nations. Only ever so slightly do the engineering professional societies nibble at the social, economic, and political dimensions of these issues, whereas the issues themselves are inseparably multi-disciplinary in character. Political scientists seldom meet with economists, and both are largely alienated from sociologi st, to say nothing of jointly developing multi-disciplinary institutions with science and engineering, so that they can all share common creative experiences.

In universities, research has followed the same narrow disciplinary channels. A scholar in political science, sociology, economics or engineering may undertake a complex research problem, but immediately he strips it down to a few simple variables which can be evaluated in the scholar's own field.

This is antithetical to both the dimensions and the character of crucial issues in complex real-life, such as might be faced by a statesman or politician. He is often dealing with multi-disciplinary, extremely complex issues - issues that may be of awesome magnitude, with consequences that are beyond human capacity to evaluate. Yet such a statesman or politician may have to make fateful decisions. Usually he retrenches in ideological approaches, the tried and true, the stereotypes, because there has been no adequate exploration of novel innovations, however desirable these might be.

A statesman so often finds that there is little in university research that can serve as useful guidelines for policy formulation or administrative decision making on crucial issues. We are still primitive in knowing how to research in multi-disciplinary ideas and domains. Universities have recently been creating multi-disciplinary institutes to develop research collaboration among scholars educated in widely divergent fields, certainly a salutary move in the right direction. Invariably, however, the centrifigal forces become operative - the engineers seclude themselves in engineering problems, the social scientists in social science

problems, etc. The assumption that a scholar who is dealing with single-discipline problems is thereby preparing himself for intellegently dealing with the vastly more complex multi-disciplinary issues of macrosystem scale is highly problematical. Our knowledge of how to philosophically explore the imponderable issues that confront societies and nations, and how to select rational goals, and research methodologies is perilously thin.

During the past half century, the enormous proliferation of new learned and professional societies that have been created as a result of the knowledge explosion is indicative of the difficulty that learned societies encounter in meeting the dynamic challenges of new ideas. In each case, young mavericks who were enthusiastically exploring new domains of knowledge, deeply resented the oppressive institutional apathy and lethargy with respect to their particular idea domains. Time and again there would be an explosion, and the mavericks would secede to form their own learned society. Suddenly a new spirit would be born, the pace would quicken, there would develop a philosophical soaring and an excitement that would attract large numbers of adventurous talented, creative youth. The new learned society would take off with a creative power that was the envy of the dispirited parent society. However, usually within a generation the new society, now aged and having lost its youthful zeal, would be well along the road toward consolidating into conventionality. History would then repeat the cycle of secession, birth, spirited growth, and relatively sterile maturity.

Our next generalization, therefore is:

> All institutions tend to fossilize around well-structured idea domains and boundaries of activities as they grow bigger and older. We really know very little about how to build institutions that can indefinitely sustain that creative fountain of perpetual youth - the zeal, the mobility and that indomitable searching of the creative spirit for new challenges to the intellect of man.

Our idea logistical systems - that is, our universities and lear ed and professional societies - are highly committed to pursu ng knowledge in conventional academic ways by academic disciplines. We have the vast sprawling discrete metropol ses of knowledge, each one representing an academic discipli e that is becoming infinitely complex.

But suddenly the world has become many orders of magnitud more complex in integrated ways that our idea logistic are not at all well adapted to handle. Many of the grea est challenges and conflicts to mankind's ingenuity and surv val today are to be found in the enormously complex, macrosys ems issues that have to be approached with high skills in philo ophically oriented and multi-disciplinary ways. Each galaxy o issues is related to countless other galaxies in intricat ways that we cannot easily fathom. In dealing with such int racting configurations of galaxies and super-galaxies of knowl ge, of social and political and human relationships - which ha e become the central core of mankind's progress and survival - we find that our traditional discipline-oriented idea log stics fail us quite completely.

And here we generalize further:

> Philosophical exploration as a tool of research for advancing knowledge, to be used by scholars of ll disciplines in exploring the outer project- ion of discovery and the use of knowledge, has bee largely discredited in scholarly circles. The increasing compartmentalization of knowledge has been driving the attention of scholars inward. The dominant trend in which scholars devote the r whole life spans to researching in single dis iplines has created what Charles Beard, a gre t political scientist, has decried as the "ty anny of specializations". Continued sub- div sion of knowledge can be a self-burying pro ess unless it is countered with a propor- tio ate and adequate outward development of phi osophically projective scholarship.

Phi osophically oriented idea logistics requires different institut onal concepts and structures from our generally accepted idea logistics of today's scholarly research. Philosop y involves a double continuum of knowledge. It is a contin um in cutting across disciplinary boundaries, drawing freely f om all of them. It is also a continuum in the time domain, n that it sweeps across the past, the present, and

the future - and of these, the most important by all odds is the future.

Conventional academics, in contrast, confine themselves to disciplinary boundaries, and generally speaking, distrust researching futures, usually regarding this as a prostitution of one's profession. Seldom ever does a PhD student undertake a research project dealing in a philosophically projective way with future probabilities. Yet, De Tocqueville, at the age of 26, in 1837, started his two years of journeys to America and his writings of Democracy In America, which projected the future evolution of this nation so profoundly and accurately that one might easily believe that it was written in contemporary times. At one time the Royal Society was highly philosophically projective in character, sweeping across the fields of science, theology, and philosophy. It stretched the mind in dimensions and ways that would be regarded as blasphemy in today's learned societies, even in the Royal Society itself. Philosophically exploratory delvings, of course, deal with probabilities in selective ways, not with certainties. Learned societies may start out in a philosophically exploratory ethos, but they soon develop conventional idea logistics which largely exclude philosophical modes of dealing with ideas. Universities and learned societies are mirror images of each other, hence universities likewise settle for the "truth", which, of course, means the proven. There was no way that Woodrow Wilson could prove that some such organization as the League of Nations would be imperative for peace in the world, or that Robert Goddard could prove that man could rocket himself to the moon and the planets, or that Frank Lloyd Wright could prove that a revolution in architecture was long overdue.

Generalizing further:

> Academia has created an anti-philosophical society by the very ways in which it has constructed its idea logistics. The greatest need of the next quarter century will be to create a philosophically-oriented society. This will require a major revolution, both in idea logistics and in academic thinking.

FUTURE ORIENTED INSTITUTIONS

"It takes a quarter of a century to institute major changes which are both logical and necessary. The world is changing fast, and it can't wait that long," decried Dr. Alexander King, Chief Scientist of the Organization for Economic Cooperation and Development (OECD) in Paris.

Historically many of the truly gigantic social-political changes have developed as a consequence of either disastrous conflict or major catastrophe - a social upheaval, a war, a revolution, an economic depression, a monetary crisis, an ecological crisis. But global evolution has now reached the stage where such means of affecting large-scale changes are no longer tolerable. Furthermore, we are living in speeded-up relativistic time, when change itself is growing in speed, in dimensions and in criticality. With two billion people in the world, living in squalor and on empty stomachs, developing expectations for a glittering new life that most of them will never experience, the chain reaction conditions are ripening for a turbulent, catastrophic future world. Man must learn how to deal with the great imponderables of his future.

Yet, no government, not even democracy, is likely to change its course abruptly toward such goals until the time is ripe, and then it may arise as a result of catastrophe and be too late. Democracy, in its two-party system, has the means of exposing conflict to public scrutiny, and in the system of periodically electing representatives, it can affect changes. The system works best when the public interest is directly involved, such as in education, crime, consumer protectionism, taxes, corruption in high office, medical protection, social security, etc. "Throw the rascals out" is an effective means of affecting change in a democracy.

In comparison with America's rate of progress, Europe has been severely throttled in industrial growth by intense nationalism, tradition, frozen ideologies, and encrusted institutional structures. In its scholarship, however, Europe has maintained quality and mobility. World War II

touched off a new wave of thinking throughout Europe, a realization that isolation spelled decadence and disaster, while mutual collaboration could produce the miracles of industry and affluence that America had gained with such ease and celerity.

Out of the ashes of bombed out cities of Europe, there emerged the idea of a Coal and Steel Community which would pool the interests of Germany, France and Belgium in the Ruhr so as to build manufacturing and marketing facilities of highest efficiency and capacity to serve all of Europe. Its success was phenomenal.

The next step, proposed jointly by Robert Schuman of France and Paul Henri Spaak of Belgium, was the European Common Market, or European Economic Community. Small inefficient industries would be allowed to consolidate into large efficient transnational corporations, operating with minimum tariff restrictions across all national boundaries.

This Common Market idea not only changed the economics of Europe, it is now changing the economics of the whole world.

It was in this setting that Dr. Alexander King, in my interview with him, was examining the dynamics of change in Europe and in the world. Obviously rapid and large-scale changes will characterize the next quarter century. Whereas in the third world - the world of starving and deprived peoples and developing nations - the nations had been sleeping prior to World War II, suddenly two billion people have now come alive and they have developed aspirations seemingly beyond all possibility of achievement.

The heroic world-wide expansion of education has lifted human talents and human expectations, and along with these, the human frustration levels. The time is now ripe for multi-national corporate expansion. However, no adequate international agreement has yet been reached, nor even seems possible. The protection of corporate investments, vital to the whole concept of industrial uplift of the world, has been hanging in mid-air, stalling the whole movement of transnational industrial development indefinitely, excepting for a few nations where conditions are more favorable. Frustration, creeping progress, social-political lethargy, population explosion, nihilism dominate much of the thinking in the developing nations.

The Truman Point IV program, by providing financial, educational, social, and technological aid, had created an opening wedge. This was a feeble beginning to a world-wide moral commitment.

It was not specific issues that Dr. King and I were discussing. Rather it was the means and instrumentalities that would somehow have to be developed to affect large-scale global planning and change.

Several fundamentals seemed abundantly evident:

a) The gigantic problems that will be involved in global planning during the next quarter century exceed by far the capabilities of the instruments of planning that are presently available, and the mobility of nations to accept change.

b) The large international associations, such as the United Nations, UNESCO, OECD, etc. are not effective instruments for formulating the overall goals and major policies of global planning. The sheer conflicts of size, of institutional inertia, and the fact that each delegate is tied back to his home government where policy is made, strait-jackets the whole organization so that it cannot effectively handle global planning.

The universities seem to hold greatest promise, in that they are free to explore bold new innovations. But there is no truly effective means of pulling this intelligence together into a meaningful, directed whole out of which the guidelines of policy can develop. Furthermore universities themselves tend to be slaves to their disciplines and have little virtuosity in projecting visionary futures.

c) The world is confronted with an organizational crisis with no easy solution. Furthermore, the visionary concept of world government seems to provide no easy answer in that it would beyond all doubt be immobilized by the same encumberances that exist in UN, UNESCO, OECD.

d) We are back to a world that will move not on the basis of wisdom and intelligence and projective visions but rather on the basis of crisis and catastrophe. There is no adequate way of bringing wisdom and intelligence, with a long philosophical look ahead, into the system of global planning. The Common Market came in on the heels of World War II, when chaos demanded that

something new be created. Will it be forever thus, that great changes cannot be achieved other than by devastating catastrophe?

There are, of course, highly competent international organizations, such as the International Banks, International Monetary Fund, World Health Organization, UNESCO, OECD. Each of these effectively plans policy in its own domains. But the sum of the parts by no means adds up to the whole.

Of central importance in idea logistics is to recognize the character and dynamics of change. Two leaders in Europe, Robert Schuman and Paul Henri Spaak, who were convinced that the economics of Europe were dead-ended, and who happened to be in high office at the same time, were largely responsible for cutting through the mountains of opposition from every conceivable source which saw nothing but doom and disaster in the Common Market plan.

The end of large-scale change is by no means in sight. There are many more ideas out in the philosophically exploratory realms that may be fully as important and strategically imperative as the common market idea. But the impenetrable gulf between ideas and their processing and translation into action makes a mockery of man's wisdom and knowledge. It is this gulf that man's intelligence cannot bridge. Furthermore, this reacts back on scholarship in the universities, stamping philosophical projectivism as an exercise in futility.

Club of Rome

Dr. Aurellio Peccei is a unique figure on the international scene. An eminently successful business man, as President of Olevetti Corporation and on the managing boards of numerous other large European corporations, he has powerfully influenced industrial development in Europe. But he is unique in a quite different way. He is a philosopher par excellence of global evolution. He has developed a comprehensive and rationally consistent philosophy of global planning and strategy. His ideas are radical and call for drastic changes. They deal with social-economic concepts and structure, technological planning, political relations and internationalism generally. His book, "The Chasm Ahead" outlines bold and far-reaching new approaches to global planning. They are not the kinds of changes that are likely to come out of UN, UNESCO or other quasi-governmental organizations.

Underlying his theories is a pervasive concern that global dynamics are severly retarded by a high degree of isolationism among nations of the world. This must be replaced as rapidly as possible by global collaboration. Greater cooperation and solidarity, while preserving the independence of nations, could enormously accelerate progress in all dimensions to benefit all people of the world. It is the sort of idealism that Norman Thomas and Clarence Streit dared to dream about, which a quarter century later permeated all facets of government in the New Deal, in the Atlantic Alliance and in NATO.

But Dr. Peccei is a realist. He goes beyond idealism in creating a new kind of non-institutionalized, powerful approach to deal projectively at top levels of professional competence with global planning. He has formed the Club of Rome. This unique organization contains as members seventy five individuals from all over the world, who are pioneering leaders of thought. They are philosophers, all of them, but also eminently competent administrators of various kinds of organizations at the frontiers of thought and action. The Club of Rome, supported by European industry, is undertaking research in universities, directed at developing a comprehensive foundation for global planning and strategy.

Dr. Peccei, has been far ahead of most contemporary international philosophers, both in the comprehensiveness of his insights in internationalism and also because he is a humanist who has a feeling for people's needs all over the world, and he clearly perceives a way of achieving a brighter future.

Right or wrong, his ideas deserve the most careful study. However, this is not likely to happen. Professional societies don't often deal in Peccei's dimensions of philosophically projective thought. They deal predominantly in current issues and in real time.

In Paris, I heard Peccei speak before an international meeting of civil engineers. His ideas excited great speculative interest. But they would soon give way to the practicalities of sewer systems, highways, and skyscrapers. Perhaps an article would appear in one of the civil engineering journals, then it would become a dead issue.

It has been estimated that if the published material on scientific and technological subjects were to continue to grow at its present rate, by the year 2000, these publications would weigh more than the entire earth. Yet, what impact can one individual, even as eminent as Dr. Peccei, have when philosophical intellectualism is dead - discredited by pragmatism and the phobia that man can't improve his lot in this world by philosophically researching his future - it just has to happen by chaos and catastrophe.

Here we again meet the inversion syndrome. Mountains towering above mountains piled with conventional academic pursuits, including an overwhelming volume of trivia. But no truly effective instrumentalities for gaining philosophical and projective insights into how man might apply his intelligence to shape the enormously more complex world that is yet to come.

Council of Europe

Unification of Europe has long been speculatively explored by adventurous individuals. Europe's sluggish growth over the past century, in comparison with the United States quite obviously can be attributed, in part at least, to European nationalism. In isolating the nations of Europe from each other, this nationalism has severely retarded industrial and commercial development. Whether political unification will ultimately be achieved or not is yet problemmatical. In a sense, the Common Market, and further proposed moves to develop a common currency and remove barriers to the free flow of people and commerce, could accomplish much that is needed to gain the effect of unification. Europe might presumably gain most of the advantages of unification, but retain its polycentralism in individual national governments which are indigenous to their nationalities.

However, a number of moves have been taken in recent years toward centralized planning for non-communist Europe. One is the formation of a Council of Europe, with headquarters in Strassburg, Germany. This organization cuts across all aspects of European planning to achieve somewhat the same goals as political unification.

The unique feature of this development, however, is its creation of an autonomous long-range planning organization known as the European Cultural Foundation, with headquarters in Amsterdam. This Foundation was created to be the philosophical and projective instrumentality of the Council of Europe. It derives its funding largely from philanthropic sources, including industry, but it also receives some funding from specialized governmental income sources.

The European Cultural Foundation is exploring futures in eleven fields of study. Its objective is to establish desirable long-range goals and then examine the successive stages of development by which these can be achieved. The Foundation largely divorces itself from the current milieu of problems, leaving these to the Council of Europe to work out. Conferences of leading authorities from all over Europe in specialized fields are arranged by the Cultural Foundation.

In discussing the Foundation's programs with Dr. Raymond Gioris, of Brussels, Chairman of the Educational Division and with others in the Foundation, it became evident that this kind of exploration of alternative futures was proving to be a highly intricate process because it necessarily involves a matrix inter-coupling between all of the fields - political, educational, social, industrial, international, etc. No single domain stands alone. They are all intricately enmeshed.

Furthermore, the outlook of Europeans with respect to traditionally held mores is undergoing profound evolutionary changes, making it necessary to deal with a spectrum of alternative futures. For example, will Europe accept one or two common languages rather than fifteen languages? Will they accept a central government? Cultural diffusion will inevitably develop, but to what extent will traditional cultural mores be retained?

Will Europe have an unlimited supply of natural resources and energy resources, or will these become scarce? What will be the international political, social, economic and cultural configurations forty years from now?

These determinants of the future are not the fate of blind destiny. Europe has the power

to plan and determine its own destiny. Furthermore, in cooperation with the United States, Russia, China, and other nations, big and small, it can powerfully contribute to the shaping of the destiny of the entire world so that world politics develops in peaceful, rational, efficient and productive directions. This power to shape the future itself is central to the concept of all of future planning.

The spectral possibilities multiply with each new variable introduced. Education presents an almost unlimited spectrum of possiblities, including many that are far out on the fringes of speculation now.

From the viewpoint of my particular study, the European Cultural Foundation represents a unique example of long-range philosophizing about futures and goal planning on a comprehensive scope, cutting across probably the most complex constellation of nations in the world.

It shares in the common dilemma that all such functions experience: how can the findings of the European Cultural Foundation gain leverage in affecting change? Fortunately this problem, is at least partially solved. The European Cultural Foundation and the Council of Europe form a unit of two autonomous pioneering institutions. The European Cultural Foundation has freedom and far-reaching research power in a philosophically exploratory sense. The Council of Europe is the operating arm that can translate ideas into action. It works with governments and institutions of all kinds throughout Europe to get legislative actions and appropiations, where needed, and to cooperatively help develop the instruments of change.

This coupling together of two pioneering institutions, each autonomous - the philosophically projective that is exploring the dynamics of change forty years ahead, and the operating unit which has the instruments to affect change, or in sociology terms, the "change agent" I believe, is a unique combination that holds great promise for the future of policy planning and forecasting. Each is large enough and has sufficient resources to exceed critical mass for chain reaction achievement.

Together they have the capacity of developing a powerful array of social indicators so as to be able to assess the present state of European culture, social development and economy, and also to facilitate evaluation of the effect of changes. Together, they form a powerful contrapuntal team.

Birds of a feather flock together. And so the philosophers and leaders of long-range planning of Europe are developing a loose but effective professional inter-communication and esprit de corps among themselves, and even interlocking directorships in various avant garde institutions. This, of course, multiplies the perceptions and the power of combined effort.

Herman Kahn and the Hudson Institute.

Noone in America has done more to advance the subject of futurology and to reveal the spectrum of evolutionary possibilities confronting the world than Herman Kahn. In his scenario revelations, he has illuminated avenues of possible future evolutionary movements that were formerly hidden behind the veil of ignorance and superficiality. Futurology - what I prefer to call the philosophy of futures - is off to a fast start. Beyond all doubt it will gain great power in many directions. Eventually it may even provide a philosophical basis for almost every domain of intellectual advance, and even might become an indigenous part of university education and research.

One dimension of this sabbatical project included a most interesting opportunity to participate in one of Herman Kahn's Hudson Institute conferences.

The scenario and delphi methods have a great deal in common. Both depend upon experts in specific fields to illuminate the future. The effectiveness, however, attenuates very rapidly as the degree of expertise of the participants and their ability to pick out the winning combinations diminishes. Generally speaking, not many individuals are so gifted. This puts the whole subject in a creatively elitist class. It is a highly individual trait. From personal observations of many creative people, I am inclined to believe that the root qualities are largely of genetic origin.

Further, our discipline-oriented universities haven't educated the kinds of people who have philosophically projective and creative talents in a broad inter-disciplinary context. How far universities might go in reorienting higher education toward developing philosophically projective and creative proclivities is a matter of conjecture. I am inclined to believe that both the universities and the learned and professional societies are oriented about 180° away from that goal now.

Certainly one of the most successful of all philosophical projectivists was the French nobleman, Alexis De Tocqueville. At the tender age of 31, he visited America in 1837 for two years. In his Democracy In America, he projected the future evolutionary development of America in all of its grandeur, its sordidness and its conflicts with such excellence in literary style and unerring precision that one might easily believe that it was written only recently. De Tocqueville had a contemporary mind in his ability to project.

Herman Kahn's methodologies are mind-stretching excercises. They devolve from deductive logic of assumed hypotheses or scenarios, changing the scenarios to explore a wide variety of possibilities. Always and always there is the lingering doubt in such projectivism that things might not happen this way at all. Historical perspective, of course, can enormously enlarge the field of vision as to what might possibly develop in the future. Indeed projectivism, without historical perspective is a useless hodge-podge. Doubtless computer logic will increasingly be added to human brain power to enlarge the exploratory and predictive processes. But the mind of man, I believe will always have the upper hand.

Other Explorations

In California, my discussions with Elizabeth Mann Borgese, daughter of Thomas Mann, and with others at the Center for Democratic Institutions opened up new insights in governmental systems. Dr. Borgese was a member of Dr. Robert M. Hutchin's research team at the University of Chicago, which a number of years ago studied alternative forms of world government. Consequently she has devoted a lifetime to social-political exploration. Dr. Borgese anticipates a quite different concept of world government from the usual plan of a chief executive and legislative branch concept. She foresees a functional development, wherein selected economists and

monetary experts would collectively deal with world economic problems, oceanographers would handle oceanology matters, statesmen would deal with political problems, scientists with scientific issues, etc.

In other words this would in a sense be a more informal form of world government by professions rather than by the usual formal political structure. The professionals, she believes, are much more knowledgable about the issues and are less likely to be bogged down by political protocol. Consequently, they can usually achieve a faster, more amicable, and more intelligent resolution of viewpoints and conflicts than when these enter the political arena.

Curiously enough, she has drawn some of her ideas from the Jugoslavian constitution. This provides for a bicameral legislative body. One of the two legislative houses, however, contains only professional people representing a variety of different professions. Apparently this has worked quite well in bringing expert professional viewpoints into the legislative process. Most governments are dominated by men trained in law who so often are only superficially familiar with the issues they are acting upon.

Dr. Borgese has one point clearly in her favor. International relations are evolving according to the general plan that she has proposed. Essentially she is projecting further and asking: Since internationalism is evolving by professional people handling professional policies, is this not a suitable format for world government in the future?

At Stanford University, my most intriguing interviews were with Jean Louis Servan-Schrieber, a French publisher, writer, and leader in governmental affairs. Messieur Schrieber was on a six months appointment at Stanford's Communications Institute. It would be difficult to categorize his views on European and global evolution. He was dubious about achieving large-scale changes by way of present institutions because of their inertia, idea fixations, tradition and limited contours of thought and action. Major change will come about either by superhuman efforts of inspired and dedicated leadership, or it will develop spontaneously from social discontent or internally or externally inflicted catastrophe. Nations have certain rythms in their evolution and development which depend upon many

interacting factors. Change can only take place in character and in time more or less within this rythmic evolutionary pattern. Dissolution of nationalism, the rise of global interrelatedness, accentuated and accelerated by the growth of multi-national corporations which will bring technological growth to nations throughout the world, are all definitely on a swift rise.

There were interviews with other individuals who are directing programs that in various ways are exploring the evolutionary character of institutions and societies at Stanford University, UCLA, University of California, Berkeley, Cal. Tech and others, including discussions with Dr. Kenneth Boulding, an eminent writer on the changing character of American society and world affairs.

White House Conference on the Industrial World Ahead

To project twenty years ahead in national and international economic development, the U.S. Department of Commerce assembled about 500 leading economists, industrial and business executives, governmental executives, Congressmen, writers, and generally people who are at the forefront of thinking in national and global economic development. My own educational background included, in addition to science and engineering, a master's degree in business administration, Consequently the spheres of economic interplay with technology and political logistics has always held considerable fascination and been an integral part of my developmental thinking in the dynamics of ideas.

The White House conference obviously dealt with one half the picture. It was an optimistic projection, onward and upward toward a more idyllic future for America, with an exciting vision of multi-national corporate developments. It acknowledge many obstacles - the American morale and work ethic (which could blow the whole projection), the availability of energy resources and raw materials, international political stability, the progression toward free trade.

The extant economic recession, caused by cutbacks in defense production and the cost overruns were a matter of considerable concern. There is no easy answer to bridge that wide chasm that separates the high technology industry, which is required for war production and the kind of industry that fulfills social and civilian needs. Technological skills are not easily transferable.

The forces that produce a robust economy are only partially stimulated by Keynesian juggling of the economic system. We really know very little about the deeper running well springs of economic prosperity. These have their origins in human factors, in the immobility of institutions of all kinds, in the barrier walls of idea logistics wherein the whole system of idea generation and translation slows down for many reasons, but in part because the barrier walls to the development of ideas become insurmountable. In economic terms, an industrial society, warped for war production purposes, is a highly inelastic system.

Learned and Professional Societies.

As stated earlier in this report, I have long been convinced that learned societies and professional societies, which play a central role in the generation and translation of ideas are inadequately structured for the kind of world that has emerged during the past half century. Primarily, they are poorly structured to bring unconventional embryo ideas into the takeoff stage of growth, and they devote an inordinate amount of effort to extant knowledge domains, where fields are plowed over and over agian.

The Robert Goddard/Frank Llyod Wright syndrome typifies this inversion phenomenon and the resulting retardation in the emergence of ideas that ultimately have the most profound long-range consequences. Ideas that are destined to revolutionize man's conceptual world are so often completely ignored by their own professions. Such ideas do not fit the standard format of learned societies. This is not merely a marginal effect. It is massive, all pervasive, and is a prime

reason for the inelasticity of idea logistics. Of course, universities and learned societies are mirror images of each other so the whole discipline structure of institutions for higher education and research is involved. Our idea logistical systems are not infrequently highly refractive to the ideas of ultimate consequence which challenge existing paradigms.

SOME GENERAL OBSERVATIONS

It is probably safe to say that few if any institutions at the cutting edge of progress today are adequately structured for the kind of society and the dynamics of change that will develop during the next quarter century.

It is not only the swift expansion of knowledge and the growing complexities of society that are driving universities, learned and professional societies, and many of the institutions involved in the advancement and utilization of knowledge to seek more effective ways of putting knowledge to use for mankind's well being. Far more importantly, the movement is toward the search for entirely new concepts and organizational approaches that are more philosophically oriented. It is a clear recognition of the fact that in today's world, an advanced society which cannot see its future doesn't have much of a future.

As Russell Davenport once expressed it: "For what causes mid-century man to fear is not merely the threat of some definable catastrophe, it is a knowledge born of doubt that he does not know how to resolve the problems that have in them the making of catastrophe."

The time when nations can ride it out and wait for wars and rebellions and social upheavals and crises to define the problems has long gone. We have had a half century of this kind of catastrophe democracy. The incidence of disaster has been increasing both in severity and in frequency. Yet, we have found no adequate alternative whereby we can bring a higher order of wisdom and intelligence into conjunction with the political and institutional systems of society. Democracy, as it presently functions, totters almost perpetually on the edge of disaster of one kind or another. It has knowledge and intelligence in abundance. But it has quite inadequate ways of using these either in sustaining a highly creative society or in averting disaster and producing a wise democracy.

Do we really know how to organize a great society? How can a democracy optimally plan its goals and achieve objectivism combined with ethical idealisms in rational balance when dealing with the totality of national and global policy?

It is easy to say that we need greatly enlarged philosophical orientations, better planning and more fluid, mobile and adaptable institutions. It is obvious that the problems of the world are leaping by many orders of magnitude in scope and complexity.

This requires quite different methods of arriving at policy and decisions on the supreme issues affecting a nation's destiny. We turn confidently to the omniscence of democracy - the will of an enlightened people-for our salvation. But do we know how we can build the eloquently sounding idealisms and shiboleths of democracy into some kind of reasonably optimal, rational and stable system of society and government?

We search for better delphi techniques, scenario methods, technological forecasting strategies, and we strive to computerize social-political systems. Certainly the excellent delphi projects of NSF, NIH, USOE, NASA, and other governmental agencies have shown that teams of experts can develop philosophically projective means of identifying promising fields of research, and that this can bring a much higher order of wisdom in mapping out plans of research strategy. Technological assessment hopefully will add a new dimension of wisdom to democracy's evolution. Mind-stretching conferences projecting ahead to the year 2000 AD have become an already overworked fad. The growing movement of universities toward transdisciplinary educational and research operations are expanding the horizons of visions.

Social, economic and political indicators can provide diagnostic information on the ambience of health. But the fact remains that the world has instability factors that are so widely prevelant as to defy the best intelligence to develop harmony and rationality. International organizations are being created for every conceivable purpose to advance the cultural and socio-economic well being of nations.

Is there a logic and system and order and sensible optimization of all of this movement toward a better organization of the intelligence of advanced societies? What kind of grand plan of idea logistics and creative dynamics is evolving? How will democracies be organized a quarter century from now? It is the delineation of some of these concepts that I am endeavoring to develop in a forthcoming book.

Perhaps it might seem hopelessly naieve to grasp at such a holistic subject that resembles an octopus with ten thousand tentacles all moving in different directions. But I am quite convinced that there is a homogeneity in the subject - that there are fundamental principles involved. To break the subject down into bits and pieces can drive out the life force and revert to the very fractionation that obscures the hope of developing an overall philosophy. It may be far more important to deal with the totality of the living and breathing organism rather than with the dissected organs.

My concern has been with the development of certain broad principles of creative dynamics and idea logistics. For example, the disciplinary structure of knowledge in universities and professional societies has caused fields of knowledge and professions to become lopsided and myopic. Certainly the Engineers Joint Council study alluded to previously showed quite clearly that engineering had become a one-eyed profession. It had failed to develop in universities, in professional societies and in its scholarly and research activities the capacity to deal philosophically and projectively with macrosystems concepts, as well as with socio-technological-economic planning on a national and global scale. Such issues, which vitally affect national destiny, all fell largely outside the purview of the engineering profession. The dynamics of national and global change had far outstripped the capacity of universities and the profession to meet the supreme challenges confronting the engineering profession.

Insofar as educational and professional societies were concerned, in 1960 engineering was quite oblivious of the fact that national needs had arisen in certain domains which within a decade would require the launching of multi-billion dollar national programs in transportation, pollution control, building new technologies within the technologically starved industries, etc. These were brought into focus, perhaps for the first time in the EJC study. This kind of identification should be a continuing function of a nation.

It is becoming abundantly evident that most of the great dilemmas confronting mankind cannot be resolved within the context of our present-day intellectualism. There is no way of achieving either the philosophical foundations of thought or the trans-disciplinary synthesis of knowledge that is imperative for an intelligent and wise democracy. The development of new multi-

disciplinary structures in universities and in the learned and professional societies is an emergent trend today. So often, however, interdisciplinary research explodes under the centrifigal forces of disciplinary retrenchments.

Delphi, scenario and technological forecasting methods are developments of specific strategies toward more philosophically projective approaches. This is the search for more rational futurizing methods of dealing with prime issues of national and international policy, as well as with the issues of ultimate destiny.

Is all of this to be controlled and guided by a monolithic system with ultimate decisions and financing vested in government? Or is there an imperative for a pluralistic system in which universities could develop an independent pioneering role, entirely apart from government, thereby maintaining the pluralistic tradition of democracy? How would such an independent "free society" development of this kind be financed?

Should this function be developed at Mt Olympus levels, calling only upon the oracles? Or is there a need to develop exploring and projective functions at the grass roots levels in the professions so as to provide open-ended opportunities for new ideas and capable young talents to bubble up to the top?

There are differnetiated characteristics in different domains. Culture, religion and the social sciences each have their own unique creative, intellectual and developmental modes which in many ways are vastly different from those of science and engineering. Yet, there is a surprising commonality in the character of the revolution which is developing in all intellectually creative fields. It is my personal belief that there will be discovered certain universal principles, that are more or less common to all fields. [of idea logistics]

Certainly not the least of the dilemmas confronting highly institutionalized societies are those associated with the questions of how advanced societies put ideas into action. This idea-action interface is fraught with endless seemingly irrational and illogical impediments to progress. Advanced societies are not well constructed to develop foresight in grappling with potentially catastrophic earthquakes that might come unexpectedly and shatter society. The whole chain including the development of insights; the projection and challenging of ideas; convergence on goals; and implementation is so often

fraught with intolerable delays. Quite often this chain process is stalled on dead center near the beginning until it is triggered by an approaching national catastrophe.

One thing is certain. How man uses his intelligence will determine the future of civilization and the destiny of mankind. It is my personal belief that in many ways *that* we cannot fathom today, this will be one of the most revolutionary fields of development during the next quarter century. Furthermore, I am quite convinced that there will be discovered many universal principles that in the aggregate will comprise the foundation of the sciences of creative dynamics and idea logistics. Advanced societies will beyond all doubt develop vastly more prodigious methods of enlarging their creative powers and they will also discover far more ingenious methods of linking intelligence and progress.

In this report more questions have been raised than answered. Customarily the first task in undertaking research is to define the problem domain. The boundaries of research are characteristically fenced in so as to confine the problem domain to something readily expressible analytically or logically. Here, the boundaries have been intentionally left open-ended. My fundamental premise is that the closed domain approaches to research often do not reach the philosophical heart of the greatest dilemmas of social and cultural evolution.

My forthcoming book will delineate some of these subjects more intensively. Consequently this report, in a sense, is a preview of a more definitive exposition which is already well under way. It has not been an easy subject to deal with since it defies the usual epistomological procedures. The project has been discussed with well over a hundred "philosophically-minded" leaders of thought in widely diverse fields in Europe and U.S. In the final analysis my own intuition must prevail as to what is important and how ~~this~~ my research should proceed.

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The following paper, which was delivered at the annual meeting of the Institute of Electrical and Electronics Engineers, suggests how a unified professional engineering society might be established for the purpose of providing a means of unifying what is now a widely disparate profession that is comprised of many professional societies, no one of which can effectively deal with macrosystems issues in multi-disciplinary domains.

Consequently each of the professional engineering societies is dealing segmentally with a part of the total need, without much coherence in the overall effort.

It would seem that a unified organizational program by the professional societies which would also involve trans-disciplinary participation with experts in such fields as sociology, political science, and economics, and also involving experts from government, would provide a far more powerful multi-disciplinary approach. The total effort would get above critical size for effective action and it would have a much more prodigious and diversified supply of professional expertise. It would develop better coherence which could powerfully enlighten not only the engineering profession, but far more importantly, government and society as well on the character of the technological needs and technological change. It would provide far more powerful approaches in delineating technology's role in national and global policy, with a long look into the future.

This is but one example of organizational changes that might be considered. Alternatively, such functions might be developed by closed groups of experts - the oracles meeting on Mt Olympus. Probably both the "grass roots" organizations and the Mt Olympus levels will be needed. Curiously, however, the engineering profession, like most professions, has not, in my estimation, adequately confronted the alternatives.

ENGINEERING AND NATIONAL POLICY

by: Arthur Bronwell
University of Connecticut

Presented at a meeting of the Committee for Social Implications of Technology of the Institute of Electrical and Electronic Engineers, New York, N.Y., March 28, 1973.

Abstract: It is suggested here that the leading professional engineering societies of the nation collaborate in creating a new professional engineering society that would bring the vast resources of knowledge and expertise of the engineering profession to bear full dimensionally upon the great issues confronting the nation and the world which are deeply technology oriented. This would also develop as a collaborative effort of the social sciences and government. It would embrace technological forecasting, the delineation of national policy goals, and projective studies of global dynamics.

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Throughout the engineering profession there is developing among many thoughtful leaders the conviction that the profession must develop new instrumentalities for grappling with the macro-systems issues involved in the dynamics of change at national and global levels. Such issues are usually multi-disciplinary in character and they often are deeply involved in technology. In simplest terms, national catastrophes arise when any profession plays the ostrich role of burying its head in the sands and assumes that the future will be a simple projection of the past.

We are living in a relativistic world that is speeding up in every dimension of human existence. National and global transformations are occuring at an increasingly rapid pace and they are becoming many orders of magnitude more complex, not infrequently having world shattering consequences. So often wars, economic depressions, social upheavals, ecological crises and other catastrophes have been the principal means of affecting social and political changes.

The professions must now learn how to live in the future. The totality of complex unresolved issues that can wreak devastating ruin on societies and nations cry out for longer range philosophical understandings and projections - the means whereby the professions can get hold of issues on a much earlier time scale in orderly, systematic processes, and work collaboratively with government and leaders in the political arena in developing optimum policy directions.

Any assumption that we are approaching the millenium, where peace and tranquility will at last be man's lot on earth, flies in the face of the enormous forces for conflict that are building up world-wide. Billions of people throughout the world, in the rich nations and the poor, are seeking better ways of life. Most of them are on the edge of poverty, yet they have caught the first glimpse of a glittering new way of life that they never before realized existed - and they now want a piece of it. Most of them have very little prospects of achieving their ambitions during

their lifetimes. Technology in many complex ways is in the center of the arena of this potential world-wide holocaust, which is appalling to contemplate. Shall we ignore it, and go on our way playing the ostrich game?

Any sensible projection of the future demands that the professions develop a far more effective system of bringing professional intelligence and wisdom into confluence with political power, not only to optimize long-range planning, but also for the enlightenment of the people. No longer can nations trust to superficiality in policy delineation, leaping from crisis to catastrophe, and tearing up societies all along the way. This kind of democracy is already archaic.

It is perhaps an accurate commentary to say that no profession today is adequately structured to deal full dimensionally with the dynamics of change that will develop during the next quarter century. The present-day fragmented institutional structures of the professional societies enables them individually at best to nibble at the edges of gigantic issues that may have colossal national and global consequences.

Increasingly government is being compelled to establish the institutional means of grappling with the preeminent issues on a future projective basis, and in the structured political heirarchy that is evolving, the ablest professional talent of the nation is being subordinated to the political, and largely marching to its tune. Whereas the professional should be leading and

guiding the procession, in actuality it is following, often a long way behind in grappling with the issues of ultimate destiny.

A twenty year technological forecast by the Engineers Joint Council in 1960-1962, ably directed by Dr. Herbert Hollomon, and involving in all about a hundred leading scientists and engineers of the nation, revealed to the engineering profession many critical national needs that almost a decade later were to become prime national target goals aggregating billions of dollars of federal appropriations. They included, among others, urban and inter-urban transportation, the nation's critical environmental blight and the need for large-scale approaches to the development of new technologies for the construction industries. Also, large domains of American industry have become technologically starved, in that they have been unable to develop the means of using modern technologies. Technology had been off fighting wars rather than building America's consumer industries. Consequently these companies today are being desecrated by foreign competition.

This EJC study, which was initiated in discussions that I had with EJC officers in 1959, opened Pandora's box to a revelation of the need for a major turn-around in national emphasis within the engineering profession. Dr. Hollomon's efforts, subsequently as Assistant Secretary of Commerce, projected these issues into sharp focus, both within the engineering profession and in the political arena. But the engineering profession is not well organized to deal with issues of such profound social consequences, or to project them into

full professional development on a scale of magnitude commensurate with the urgency and criticality of national need.

No nation in the world has greater professional talent and expert competence than America, capable of dealing in the largest multi-disciplinary context with national and global issues of preeminent consequence. Yet it remains to develop the professional society means whereby this talent can grapple full dimensionally at highest levels of professional competence with such issues, and to bring this professional ingenuity and innovative thinking into effective confluence with political democracy.

Specifically, it is proposed that the major professional engineering societies of the nation collaborate in a joint undertaking to create a professional society which, for convenience purpose, I shall refer to as the Engineering Institute for Policy Studies. Membership would be open to all members of the participating professional societies, with a special class of membership for economists, sociologists, political scientists, and others whose professional interests overlap with science and engineering. It would provide forums, publications, and the full complement of professional society activities.

However, in several ways this Institute for Policy studies would differ rather substantially from present professional engineering societies. First, there must somehow be built into the organization a "quality factor", whereby it will deal primarily with "prime" issues, that is, with matters of supreme importance and not get

buried in pursuing knowledge into all of the catacombs. How this might be achieved or how the prime issues might be defined I am not prepared to suggest, but it seems that professional societies so often have a rather low center of gravity in terms of the relative importance of ideas dealt with. An overwhelming amount of this is of the Pied Piper variety, following the leaders on and on, even to the limits of trivia.

Furthermore, the Society for Policy Studies must be both philosophically and projectively oriented. That is, it must be capable of dealing in futures and exploring in widest dimensions the various alternatives of policy and where these might lead in terms of national and global consequences. It must be both ingenious and innovative, yet responsible to highest professional ethics. Its philosophical explorations and projective studies must derive out of historical perspective, yet not be bound by ideologies and stereotypes. It must draw fully upon the ablest professional experts in the nation and involve top governmental officials, eminent statesmen and Congressional leaders, perhaps by according selected individuals honorary membership in the Society. Business leaders who can contribute to the successful functioning of the Society would also be accorded membership.

Above all, it must cultivate a coming generation of young, talented, perceptive and socially responsible engineers who are eminently qualified to deal with macrosystems issues and policy planning at both national and transnational levels.

Wherein does such a professional society differ from the National Academy of Engineers, which was created specifically for this purpose? I believe that the engineering profession's experience with "Mt Olympus" type of organizations, involving the leading professional people of the nation has clearly demonstrated the limitations of such organizational attempts. These people are just too busy with their own professional interests to devote the time and effort necessary to grapple with issues outside of their immediate concerns, and so the whole effort simmers down to a few projects of primary concern to several of the leaders.

It has always been from the younger members of the professions where the zeal and the leadership, both in ideas and in propulsive energy has developed, and such an Institute of Policy studies will most certainly have to draw upon these infinitely renewable reservoirs of talent and energy. If no grass roots organization exists to bring forth a generation of capable and talented youth, then obviously Mt Olympus would be drawing from dry reservoirs, and that is much the situation that exists today.

I see no alternative to the professional engineering societies coming to grips with this urgent imperative head-on and establishing a unified multi-disciplinary professional society to grapple at largest dimensions with the great issues of the present and future.

Furthermore, there is urgent need of rather drastic reforms in colleges and universities to develop new hybrid educational

programs at graduate levels, as well as the research capabilities and the multi-disciplinary educational programs which would underly such large-scale philosophical and exploratory studies. This is by no means a patchwork job. It would in itself require extensive innovation on the part of highly competent and ingenious faculty members, drawing from many disciplines, and perhaps all developed in a hostile university environment.

An Engineering Institute for Policy Studies would be enormously beneficial to bring together faculty members of many disciplines, all with a common focus represented by the vision and purposes of the society. A new dimension of engineering would be born - a kind of engineer that would have broad ranging intellectual interests and capabilities, coupled with a highly motivating philosophy of responsibility for the destiny of civilization and the peaceful survival of mankind.

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BIOGRAPHICAL NOTE

Arthur B. Bronwell
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Initiated the first long-range (25 year) forecast of the nation's technological needs. This two-year study, conducted by the Engineers Joint Council in 1960, which involved about 100 leading engineers and scientists, projected into national focus many of the nation's present-day large-scale technological goals. The EJC study was preceeded by an NSF supported two-day conference held in 1959 attended by 40 engineers and scientists initiated and organized by A. Bronwell.

Author of following books:

Science and Technology in the World of the Future, Editor John Wiley and Sons. This book was included in Library Journal's list of 100 best books published in 1970. Editor's chapters on "The Creative Society" and "Peace, War and Technology" laid the philosophical foundation for his later research.

Advanced Mathematics in Physics and Engineering, McGraw-Hill Book Company.

Theory and Application of Microwaves (with R.E. Beam), McGraw-Hill Book Company. Translated into three languages.

Dynamics of Ideas (book now in progress).
Author of 35 articles in technical journals.

Honors:

LL.D. (Hon) Northeastern University
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Fellow of Institute of Electrical and Electronics Engineers
Distinguished alumni award, Illinois Institute of Technology.

Professional Activities:

Participant in White House Conference on "The Industrial World of ~~Tomorrow~~." *The Future*
Presentations before the following international congresses - UNESCO (Paris); World Congress of Engineers and Architects (Tel Aviv); Pan American Engineering (San Juan), European Technological Forecasting (London), Industrial Management (Mexico City).
U.S. Government mission to Japan (Engineering Education and Industrial Recovery).
Organized and directed Army Signal Corps officers training program.
Directed radar research program for Air Force.
Co-founder and president, National Electronics Conference.
Organized projects for professional engineering societies, including project for Am. Soc. For Engineering Education on "Research Collaboration Between Industry and Engineering Colleges."
Obtained $409,000 for Engr III (NSF grant)
Instructor to Professor Northwestern University.

Membership in professional Societies:

Institute of Electrical and Electronics Engrs.
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Council on Foreign Relations
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Degrees:

B.S., M.S. Illinois Institute of Technology. Master of Business Administration, Northwestern University.